

Topic: **Magnetic Surveying Techniques**
Audience: Afghanistan Geological Survey (AGS) Geophysics Team
Participants: 8
Duration: 50 hours
Delivered: June 26 – September 13, 2006 (Intermittently)
Instructor: Charles Lindsay (USGS) and Jared Abraham (USGS)

Summary:

Participants received practical training in ground-based magnetic surveying techniques and were introduced to aeromagnetic surveying techniques. Training covered field survey procedures, the processing and graphical presentation of magnetic data, and an introduction to the interpretation of magnetic data. At the culmination of the training, four course participants* independently completed a ground-based magnetic survey from East to West across central Afghanistan (Charikar to Chagcharan, a distance of approximately 700 km).

Training of ground-based field survey techniques was done using a Geometrics G-856 proton-precession magnetometer. Participants conducted both single- and dual-sensor surveys and were instructed in: reduction of operator noise, various sensor positions, magnetometer tuning, optimizing sensitivity for local magnetic gradient, and monitoring diurnal variation using a base station. Participants designed surveys at significantly different scales using a survey tape, pace and compass, and a handheld GPS to locate individual stations. Station observations were recorded with the internal data logger and with detailed field notes.

Uncorrected data from individual magnetic profiles were first plotted manually and then processed and corrected using Geometrics MagMap2000 and Microsoft Excel. Participants then imported magnetic and location (GPS) data into Golden Surfer and produced contoured magnetic anomaly maps. Selected participants* visited Kandahar airfield, the base of operations for the U.S.G.S. aeromagnetic survey of Afghanistan. Participants toured the Navy Research Laboratory P-3 Orion aircraft that served as the airborne geophysical platform. They also received training in the processing of aeromagnetic data using Oasis montaj.

Participants were introduced to the qualitative interpretation of magnetic data. Simple models were used to illustrate how certain geologic sources produce magnetic anomalies with characteristic geometries. The general concept of anomaly wavelength as a function of depth was introduced using aeromagnetic data from Afghanistan. Participants discussed the potential application of magnetic surveying techniques to environmental, engineering, and exploration geophysical studies in Afghanistan.

Participants:

Mohammad Alam, Said Ashan*♦, Faizulla, Sardar Hussain*, Abdul Hakim Kohistany*♦, Ghulam Rahman, Ghulam Sakhi*♦, Mohammad Zia